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identical xerophytic characters occur under a wide range of external conditions that are physiologically equivalent.

CARLTON C. CURTIS

The Principles of Direct-current Electrical Engineering. By JAMES R. BARR, A.M.I.E.E., Lecturer in Electrical Engineering, Heriot-Watt College, Edinburgh. New York, The Macmillan Company; London, Whittaker & Co. 1908. Pp. viii + 551; 294 illustrations.

There are several ways in which the general subject of electrical engineering may be divided for study or treatment in text-books. One very general scheme is first to take up the study of direct-current phenomena as applied to direct-current machinery, then to consider the study of alternating currents and alternating-current machinery, and finally to study the subject of transmission and distribution of power by both direct and alternating currents. A second method of division is to consider direct currents as a special case of periodic currents and to make the general division of the study of generators and receivers between induction apparatus and synchronous machines. Here again the subject of transmission and distribution is treated after a study of the machinery of both classes. A third classification consists of dividing the general subject into direct-current engineering and alternating-current engineering, treating under each head the generators, receivers, and systems of distribution utilizing direct currents or alternating currents as the case may be. For those who prefer the third classification the author has prepared a volume on the first division which should find a considerable application in colleges and technical schools.

The general method of treatment is not different from that used by other authors who prefer to consider direct-current engineering as separate from alternating-current phenomena. The first chapter is devoted to a review of the subject of units used, the relation of all practical units to the fundamental units being carefully stated. This is followed by

chapters dealing with the laws of the electric circuit and the magnetic circuit, but before the application of these laws to the direct-current generator is taken up in detail a carefully written chapter on measuring instruments, in which the principle of operation and the sources of error of most of the instruments in common use are considered, is introduced, and this is followed by a brief study of the storage battery, electric lighting and cables. Three chapters are devoted to the direct-current generator, and in these three chapters the author has placed in a logical manner most of the information desired by those not interested directly in the details of designing. The subjects of motors and boosters are similarly treated and the book is completed by chapters on testing and electricity control, the final chapter setting forth the general principles involved in the design of the switchboard and of protective apparatus.

From the beginning the book deals primarily with the principles involved, the details of apparatus being introduced as illustrations of the manner in which the principles are applied rather than for the purpose of furnishing a catalogue of apparatus. To further aid the student in making application of general principles to calculations, carefully prepared problems with their complete solutions are introduced at intervals throughout the text, and similar problems for solution by the students themselves are stated in an appendix. The problems as given are practical and the illustrations of machinery and instruments are taken from modern practise. The use of two colors in the diagrams of armature windings and other connections should aid the student greatly in his study of the subject. The index of the book is complete enough to make it a ready work of reference.

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
June 26, 1908

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Experimental Zoology, Vol. V., No. 4 (June, 1908), contains the following papers:

The Chromosomes in Diabrotica vittata, Diabrotica soror and Diabrotica 12-punctata: N. M. STEVENS.

Diabrotica vittata has an unpaired heterochromosome which passes undivided to one pole of the first spermatocyte spindle and divides in the second maturation division. *Diabrotica soror* and *Diabrotica 12-punctata* have, in addition to the unpaired heterochromosome, in about fifty per cent. of the male individuals collected, one, two, three or four small "supernumerary" heterochromosomes, the number being constant for the individual. The supernumeraries divide sometimes in the first, sometimes in the second spermatocyte mitosis.

The Experimental Control of Asymmetry at Different Stages in the Development of the Lobster: VICTOR E. EMMEL.

In the adult lobster asymmetry of the chelæ is very stable and not subject to reversal, but in the first four larval stages it was found that right or left asymmetry can be produced at the will of the experimenter; consequently it appears that the possibility for experimental control of asymmetry is correlated in some way with the degree of differentiation or development of the organism. These facts indicate that the factors controlling asymmetry become operative after the organism leaves the egg, and that "right- or left-handedness" is not necessarily a question of "inheritance" or even of "alterations in germinal organization."

The Physiological Basis of Restitution of Lost Parts: C. M. CHILD.

The paper includes a discussion of Holmes's hypothesis of form-regulation and a statement of the writer's position regarding the physiological basis of the process of restitution, which is that a lost part can be replaced only when some other remaining part is physiologically sufficiently similar to it to perform its chief functions qualitatively if not quantitatively, after its removal.

The Process of Heredity as exhibited by the Development of Fundulus Hybrids: H. H. NEWMAN.

Heredity is conceived of as essentially a

resemblance in developmental process between offspring and parents and is studied experimentally as such.

In hybrids between these two species of fish the earliest disturbances of the normal developmental process produced by the introduction of foreign spermatozoa are noted, the origin and rhythmic flux of characters are studied, and attempts are made to get some light on the ultimate physiology of the process. Accompanying the paper are pictorial tables showing the comparative developmental processes of the two pure breeds and the reciprocal crosses.

Variation, Heredity and Evolution in Protozoa. I. The Fate of New Structural Characters in Paramecium, with Special Reference to the Question of the Inheritance of Acquired Characters in Protozoa: H. S. JENNINGS.

The author followed the fate at reproduction of many new or "acquired" structural characters, some produced experimentally, some found in nature. These were not inherited. Sometimes such a character is handed on bodily to a single individual of each generation; one was thus followed for twenty-two generations. But there is no tendency for them to multiply and produce a race bearing them. Such a tendency shows itself only in the case of the very rare characteristics arising from something permanently modifying the process of fission. "The inheritance of acquired characters" takes place no more readily nor generally in protozoa than in higher organisms.

LITHIUM IN RADIOACTIVE MINERALS¹

THE question as to whether lithium is or is not a widely occurring element, and whether it is found associated with any other element, more particularly with copper than with the alkalis or the alkaline earths, arises from the assumed transmutation of copper contained in solutions, into lithium, neon and possibly other substances.

¹ Abstract of a paper by Professor W. N. Hartley at the Dublin meeting of the British Association.